

CLAIMS

What is claimed is:

5 1. A rotary target for use in physical deposition processing wherein a backing tube is used comprising:

 a rotary target segment assembleable on-site and disassembleable on-site onto and from the backing tube; and

 a mechanical attachment of the rotary target segment to the backing tube.

10 2. The rotary target of claim 1 comprising at least two rotary target segments.

 3. The rotary target of claim 2 comprising a joint between said rotary target segments.

15 4. The rotary target of claim 2 wherein said rotary target segments are disposable in serial position to one another.

 5. The rotary target of claim 1 wherein said rotary target segment comprises at least one material selected from the group consisting of a pure metal, refractory, ceramic, alloy and oxide.

20 6. The rotary target of claim 5 wherein said rotary target segment comprises at least one material selected from the group consisting of gold, silver, copper, niobium, tantalum, platinum, palladium, rhodium, iridium, ruthenium, osmium, carbon, silicon, molybdenum, tungsten, vanadium, zirconium, chromium, beryllium, nickel, chrome, nickel-chrome, aluminum, zinc, tin, tin-zinc, zinc-aluminum, and high intrinsic value materials.

 7. The rotary target of claim 1 comprising any diameter.

30 8. The rotary target of claim 7 comprising a diameter of between approximately 3 centimeters and approximately 50 centimeters.

 9. The rotary target of claim 1 comprising any length.

35 10. The rotary target of claim 9 comprising a length of between approximately 1 foot and approximately 4 meters.

11. The rotary target of claim 2 comprising more than two rotary target segments.

12. The rotary target of claim 3 wherein said rotary target segments and said joint have
5 substantially little or no impurities.

13. The rotary target of claim 3 wherein said joint is selected from the group consisting of a
square cut and a tapered cut.

10 14. The rotary target of claim 1 further comprising the backing tube.

15 15. The rotary target of claim 1 wherein said mechanical attachment comprises a locking
assembly.

16 16. The rotary target of claim 15 wherein said locking ring assembly comprises an outer
ring and an inner ring and cooperative threading between said outer ring and said inner ring.

17 17. The rotary target of claim 15 wherein said rotary target segment abuts against or is
disposable over an end said locking ring assembly.

20 18. The rotary target of claim 16 wherein at least one of said outer ring and said inner ring
comprises a clam-shell with a hinge.

25 19. The rotary target of claim 15 wherein said locking ring assembly is disposable within a
groove in the backing tube.

20. The rotary target of claim 1 wherein said mechanical attachment comprises a
compression assembly.

30 21. The rotary target of claim 20 wherein said, compression assembly comprises a
threaded end cap on an end of the backing tube.

35 22. The rotary target of claim 1 wherein said mechanical attachment comprises a lock and
key assembly.

23. The rotary target of claim 1 wherein said attachment comprises cooperative threading on said rotary target segment and the backing tube.

24. The rotary target of claim 23 wherein said cooperative threading is along an entire length of said rotary target segment.

25. The rotary target of claim 23 wherein said cooperative threading is along a portion of said rotary target segment.

26. The rotary target of claim 2 comprising a smooth joint between said rotary target segments.

27. The rotary target of claim 14 wherein said mechanical attachment comprises an interference slip fit between said rotary target segment and said backing tube.

28. The rotary target of claim 26 wherein said interference slip fit comprises said rotary target segment comprising an inner diameter slightly smaller to an outside diameter of said backing tube.

29. The rotary target of claim 14 wherein said interference slip fit comprises said rotary target segment comprising an inner diameter substantially equal to an outside diameter of said backing tube.

30. The rotary target of claim 14 further comprising an adherent material between said rotary target segments and said backing tube.

31. The rotary target of claim 14 further comprising an adhesive material between said rotary target segments and said backing tube.

32. The rotary target of claim 31 wherein said adhesive is thermally conductive.

33. The rotary target of claim 31 wherein said adhesive is electrically conductive.

34. A method for on-site mechanical assembly of a rotary target, the method comprising the steps of:

providing at least one rotary target segment;
providing a backing tube; and
mechanically assembling the rotary target segment on the backing tube.

35. The method of claim 34 wherein the steps of providing the rotary target segment and the backing tube comprise providing an inner diameter of the rotary target segment larger than an outside diameter of the backing tube.

36. The method of claim 34 wherein the steps of providing the rotary target segment and the backing tube comprises providing an inner diameter of the rotary target segment slightly smaller than an outside diameter of the backing tube.

37. The method of claim 34 wherein the steps of providing the rotary target segment and the backing tube comprise providing an inner diameter of the rotary target segment nearly equal to an outside diameter of the backing tube.

38. The method of claim 34 wherein the step of mechanically assembling the rotary target segment on the backing tube comprises heating the rotary target segment prior to assembly on the backing tube to expand the rotary target segment.

39. The method of claim 38 wherein the step of mechanically assembling the rotary target segment on the backing tube further comprises the step of slipping the expanded rotary target segment over the backing tube.

40. The method of claim 39 further comprising the step of cooling the rotary target segment disposed on the backing tube, shrinking the rotary target segment and creating a tight fit with the backing tube.

41. The method of claim 34 wherein the step of mechanically assembling the rotary target segment on the backing tube comprises cooling and shrinking the backing tube prior to disposition of the rotary target segment on the backing tube.

42. The method of claim 41 wherein the step of disposing the rotary target segment on the backing tube further comprises the step of slipping the rotary target segment over the backing tube.

43. The method of claim 42 further comprising the step of warming the backing tube,
5 expanding the backing tube and creating a tight fit with the rotary target segment.

44. The method of claim 34 wherein the step of providing at least one rotary target segment comprises providing at least two rotary target segments.

45. The method of claim 44 wherein the step of mechanically assembling the rotary target segments on the backing tube comprises joining the rotary target segments.

46. The method of claim 34 wherein the step of mechanically assembling the rotary target segment on the backing tube comprises using a locking assembly.

47. The method of claim 46 wherein the step of using a locking assembly comprises locking a ring into a groove of the backing tube.

48. The method of claim 46 wherein the step of using a locking assembly comprises using an outer ring and an inner ring.

49. The method of claim 49 wherein the step of using an outer ring and an inner ring comprises using cooperative threading between the inner ring and the outer ring.

50. The method of claim 46 wherein the step of using a locking assembly comprises abutting the locking assembly against the rotary target segment.

51. The method of claim 46 wherein the step of using a locking assembly comprises disposing the rotary target segment over an end of the locking assembly.

52. The method of claim 34 wherein the step of mechanically assembling the rotary target segment on the backing tube comprises threading the rotary target segment onto the backing tube.

53. The method of claim 52 wherein the step of threading comprises threading along an entirety of the backing tube.

54. The method of claim 52 wherein the step of threading comprises threading along a portion of the backing tube.

5 55. The method of claim 34 wherein the step of mechanically assembling the rotary target segment onto the backing tube comprises using a lock and key assembly.

56. The method of claim 45 wherein the step of joining the rotary target segments comprises joining at least some ends of the rotary target segments with at least one joint selected from
10 the group consisting of a square cut, tapered cut, smooth joint and seam.

57. The method of claim 34 further comprising the step of backfilling between the rotary target segment and the backing tube.

15 58. The method of claim 57 wherein the step of backfilling comprises backfilling with an adhesive material.

59. The method of claim 58 wherein the step of backfilling comprises backfilling with an electrically conductive adhesive.
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60. The method of claim 59 wherein the step of backfilling comprises backfilling with a thermally conductive adhesive.

25 61. The method of claim 57 wherein the step of backfilling comprises backfilling with an adherent material.

62. The method of claim 61 wherein the step of backfilling further comprises backfilling with an adherent low vapor pressure metal.

30 63. The method of claim 61 wherein the step of backfilling comprises backfilling with at least one material selected from the group consisting of indium, silver, and metal alloys.

64. The method of claim 34 further comprising the step of disassembling on-site the rotary target segment from the backing tube after the rotary target segment is spent.
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65. The method of claim 64 further comprising the step of reusing the backing tube with a new rotary target segment.

66. The method of claim 34 wherein the step of mechanically assembling the rotary target segment on the backing tube comprises using a compression fitting.

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67. The method of claim 66 wherein the step of using a compression fitting comprises of using an end cap on the backing tube.

68. The method of claim 67 wherein the step of using an end cap on the backing tube comprises threading on the end cap, sliding the rotary target segment onto the backing tube, and screwing the end cap onto the backing tube, and abutting against the rotary target segment.

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